QUANTITATIVE IMAGING WORKSHOP XIX:
Utilizing Quantitative Thoracic Imaging to Optimize Population Health

November 3-4, 2022 | Virtual

TECHNICAL BREAKOUT SESSION
Harnessing Photon Counting CT and AI

OVERVIEW

This year we are focusing on two main technical areas:

1. **New CT Technologies: Opportunities and Challenges**

   CT imaging technology continues to advance at a rapid pace opening up new opportunities to better detect and manage early lung cancer as well as potential challenges with respect to lung nodule detection and measurement. The recent arrival of commercially available CT photon counting scanners promise major increases in resolution, lower radiation doses, and the ability to provide energy resolved imaging, which offer new opportunities in the lung cancer screening setting. In addition, artificial intelligence methods continue to be used in more and more components of the CT image formation process and also have the potential to improve image quality. However, as we have seen with previous major advances in CT imaging, the potential exists for some implementations of these new technologies to also come with challenges. For example, will photon-counting work well for large patients with small lung nodules in the periphery? Will future AI reconstruction methods be trained on ethnically diverse populations and successfully avoid unintended biases? This session will explore the new opportunities as well as explore how the community can make sure these next generation CT scanner implementations are resilient and perform well given the diversity of patients and the hospitals in which they will operate.

2. **Integrating AI Into the Lung Health Workflow**

   Artificial intelligence has the potential to greatly improve the performance and productivity of radiologists performing CT lung cancer screening readings. A fully automated AI reading of a CT lung cancer screening study will typically produce lung nodule detection findings and lung nodule volume measurements on the detected nodules. To achieve this, lung AI algorithms typically automatically segment the lungs and lobes, which then can be used to calculate quantitative measurements of the lung field (e.g., emphysema burden metrics). In addition, numerous thoracic CT measurements can also be automatically obtained including bone density measurements from the spine, detection and analysis of cardiac calcifications, and measurements of the liver. While all of this additional quantitative information is potentially useful, it has no real-world use unless it can be integrated into the lung screening workflow. Thus, it is important that a CT lung cancer screening AI system must integrate well with lung cancer screening management systems and hospital Electronic Health Records (EHR) so that this rich quantitative information can be used in screening management protocols and captured in EHR records.

QUESTIONS

1. What are the most promising applications of photon-counting to CT lung cancer screening?
2. How successful has AI been in improving detection of early lung cancer in the community hospital setting? What barriers remain in adoption and is anything needed to achieve wider success?
3. How do we best ensure that AI methods are developed with diverse population databases?
4. What are the best opportunities to add AI into the CT lung screening clinical workflow?
5. Do we need any changes to the DICOM® specification to enable better AI integration?
6. How do we link radiology workflow solutions to ambulatory sites especially in low resource areas that may not use an electronic health record (EHR)?
7. Can cloud-based resources be available to work with non EHR-bases systems?